

August 19, 2005

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 AND BYRON STATION, UNITS 1 AND 2 - RESPONSE TO NRC BULLETIN 2003-01, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT PRESSURIZED WATER REACTORS (TAC NOS. MB9558, MB9559, MB9560, AND MB9561)

Dear Mr. Crane:

By letter dated August 6, 2003, as supplemented by letter dated July 15, 2004, you provided your response to U.S. Nuclear Regulatory Commission (NRC) Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003. In your response, you stated that Braidwood and Byron are Option 2 plants and you described the interim compensatory measures for the plants.

As described in the enclosed evaluation, the NRC staff has reviewed your Option 2 response for compensatory measures that were or were to have been implemented to reduce the interim risk associated with potentially degraded or nonconforming emergency core cooling system and containment spray system recirculation functions. Based on your response, the NRC staff has determined that your actions are responsive to and meet the intent of Bulletin 2003-01. Therefore, we are closing the TACs associated with this review. Please retain any records of your actions in response to Bulletin 2003-01, as the NRC staff may conduct inspection activities regarding this issue.

Contact me if you have any questions.

Sincerely,

/RA/

Jon B. Hopkins, Senior Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos.: STN 50-454, STN 50-455, STN 50-456
and STN 50-457

Enclosure: As stated

cc w/encl: See next page

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EVALUATION OF RESPONSE TO BULLETIN 2003-01

EXELON GENERATION COMPANY, LLC

BYRON STATION, UNIT NOS. 1 AND 2

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456 AND STN 50-457

Introduction

By letter dated August 6, 2003 (ADAMS ML032200362), as supplemented by letter dated July 15, 2004 (ADAMS ML041980383), Exelon Generation Company, LLC (Exelon or the licensee), provided its response for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, to U.S. Nuclear Regulatory Commission (NRC) Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," dated June 9, 2003 (ADAMS ML031600259).

Regulatory Evaluation

The NRC issued Bulletin 2003-01 to all pressurized-water reactor (PWR) licensees requesting that they provide a response, within 60 days of the date of the Bulletin, that contains the information requested in either Option 1 or Option 2 (stated below) of the Bulletin.

- Option 1: State that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Discussion section, and are in compliance with all existing applicable regulatory requirements.
- Option 2: Describe any interim compensatory measures that have been implemented or that will be implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory measures listed in the Discussion section will not be implemented, provide a justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

Enclosure

Bulletin 2003-01 discussed six categories of interim compensatory measures (ICMs): (1) operator training on indications of and responses to sump clogging; (2) procedural modifications if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently); (3) ensuring that alternative water sources are available to refill the reactor water storage tank (RWST) or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere; (4) more aggressive containment cleaning and increased foreign material controls; (5) ensuring containment drainage paths are unblocked; and (6) ensuring sump screens are free of adverse gaps and breaches.

Technical Evaluation

Exelon provided an Option 2 response for Braidwood and Byron.

The licensee stated that the thermal insulation used on the reactor coolant piping and on the exterior of the reactor vessel is reflective metal insulation (RMI), and that at Braidwood and Byron, two ECCS sumps each serve one train of the ECCS and containment spray system. The licensee further stated that the following ICMs would be implemented:

- (1) operator training on indications of and responses to sump clogging, including simulator training on steps to delay RWST depletion - ICM category #1 and ICM category #2;
- (2) more aggressive containment cleaning and foreign materials control, including specific references to potential debris sources in the containment loose debris inspection procedures, and revisions to containment access procedures to ensure consistent implementation of the loose debris inspection procedure - ICM category #4; and
- (3) ensuring containment drainage paths are unblocked, including the addition of two inside missile barrier (IMB) access openings and their screen doors at containment elevation 377 feet to the containment loose debris inspection procedure - ICM category #5.

The licensee also stated that the following would not be implemented as ICMs, because they had already been implemented on a permanent basis:

- (1) ensuring sump screens are free of gaps and breaches - ICM category #6; and
- (2) ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the core and spray into the containment atmosphere - ICM category #3.

The licensee's response also contained the following statements:

- (1) to reduce the potential for latent debris inside containment, procedures would be enhanced to include specific references to debris sources and make loose debris inspection an integral aspect of containment access - ICM category #4; and
- (2) that it would be inappropriate to implement the suggested practice of delaying the initiation of cold leg recirculation by reducing ECCS flow during the injection phase of design basis events, but that Byron and Braidwood would monitor Westinghouse Owners Group (WOG) activities to address ECCS sump blockage and would consider implementation of any issued guidance.

In March 2004, the WOG issued WCAP-16204, Revision 1, "Evaluation of Potential ERG and EPG Charges to Address NRC Bulletin 2003-01 Recommendation (PA-SEE-0085)."

In a July 15, 2004, response to a May 4, 2004, NRC request for additional information (RAI), and a July 8, 2004 correction to that NRC RAI, Exelon stated that it would be implementing the following WOG candidate operator actions (COAs) from WCAP-16204:

- (1) COA 5 - refill of RWST after switchover to containment sump recirculation (by June 30, 2005) - ICM category #3
- (2) COA 6 - pending evaluation of the impact of higher water levels inside the containment, injection of more than one RWST volume from a refilled RWST or by bypassing the RWST (by June 30, 2005) - ICM category #3;
- (3) COA 7 - provision of more aggressive cooldown and depressurization following a small break LOCA through procedure changes and operator training to emphasize the need to provide a "rapid" cooldown (by January 31, 2005) - ICM category #2;
- (4) COA 8 - provision of guidance on symptoms and identification of containment sump blockage with enhanced use of containment sump level indications, predicated on evaluation of whether on the water level indication from in-sump instrumentation can be expected to be accurate and reliable in post-accident situations (by June 30, 2005) - ICM category #1; and
- (5) COA 9 - development of contingency actions in response to containment sump blockage, loss of suction and cavitation through implementation of the new WOG Sump Blockage Control Room Guideline (SBCRG) (by June 30, 2005) - ICM category #1.

In its letter of July 15, 2004, the licensee further stated, with justifications, that it would not be implementing the following WOG COAs:

- (1) COA 1A - secure one containment spray pump prior to initiating containment sump recirculation (securing one containment spray pump will have virtually no

effect on delaying switchover to containment sump recirculation in a large-break loss-of-coolant accident (LOCA), and for a small-break LOCA, reactor coolant system pressure may be above residual heat removal (RHR) pump shutoff head, containment pressure may not exceed the core spray actuation setpoint of 20 psig, and therefore, the low volume centrifugal charging pumps and safety injection pumps would draw so little upon the RWST that the time to switchover on RWST low level would by necessity be significantly increased).

- (2) COA 1B - secure both containment spray pumps prior to initiating containment sump recirculation (containment spray pumps are required for iodine removal and pH control);
- (3) COA 2 - manually establish one train of containment sump recirculation prior to automatic actuation (debris accumulation at the ECCS sump screens may increase because debris present in the LOCA water would have less time to settle to the containment floor before recirculation flow from the ECCS sump begins);
- (4) COA 3 - terminate one train of the ECCS system after recirculation alignment (significant blockage unlikely at this RMI plant);
- (5) COA 4 - early termination of one RHR pump prior to recirculation alignment (CE plants only, unlike Byron/Braidwood Westinghouse design);
- (6) COA 10 - early termination of one train of high pressure safety injection/high head injection prior to recirculation alignment (CE plants only, unlike Byron/Braidwood Westinghouse design); and
- (7) COA 11 - prevent or delay containment spray for small-break LOCAs in ice condenser plants (Byron and Braidwood are not ice condenser plants).

Conclusion

The NRC staff has reviewed the Braidwood and Byron Option 2 response for compensatory measures that were or were to have been implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions. Based on its review of the licensee's submittals, as described above, the NRC staff has determined that the licensee's actions are responsive to and meet the intent of Bulletin 2003-01.

Records of actions generated in response to Bulletin 2003-01 should be retained, as the NRC staff may conduct inspection activities regarding this issue.

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Date: August 19, 2005

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